

DATE 13 July 1954

TO

FROM

SUBJECT Provision for Variable Range and Variable Time Delay on  
4 Inch Rocket.

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A series of discussions among the group working on this rocket have lead to certain conclusions regarding feasibility of different designs for this design. These designs fall into three categories which can be classified as follows:

1. Five different complete motors.
2. One complete assembled motor from which increments can be removed to obtain different ranges.
3. A single motor into which incremental powder charges would be assembled by the field operator.

Each of these has distinct advantages and disadvantages which are listed below under each device.

1. Five different motor tubes.

The advantages of this design are:

1. Field operation is greatly simplified.
2. A single elevation is required for the launching device.
3. The operator has no adjustments or assembly operations involved.
4. This design is believed to produce the highest degree of accuracy.
5. The development task would be the cheapest of the designs considered.
6. The development can take place in steps which should result in our ability to supply a finished item for one of the ranges for operational test in a very short period of time.
7. The materials left over from a single firing are usable for another firing with another warhead.

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8. This design corresponds to a production item which would be completely assembled and ready for use so that the chances for malfunctioning are greatly reduced.

The disadvantages of this design are:

1. Five different time delays are required for the five different motors.
2. The bulk of unused material is greater than for the multiple increment varieties.

2. One motor with increments to be removed for five different ranges.

The advantages of this design are as follows:

1. Less bulk is left over for certain ranges.
2. We would be preparing only one finished device.

The disadvantages of this design are as follows:

1. This would require the development or adaption of a quick disconnect pressure sealing fitting.
2. If the device is designed for a single time delay, it would require variable elevation settings for launching.
3. The materials left over from single firing are not usable for subsequent firings.
4. The item is much more complicated to manufacture.
5. This device would be a complicated development job and partial completion of the development would not result in a usable device.

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6. There would be the possibility of failure of ignition of one or more of the incremental motors which could result in great inaccuracy.

3. Single motor to be assembled by operator.

Advantages:

1. Requires only one motor tube.
2. Less bulk to carry than design #1.
3. Less expensive than design #2.
4. Only one delay required if five elevations are used for launching.
5. Development can take place in steps.
6. If a development is incomplete, a usable device can be obtained.

The disadvantages of this design follow:

1. It requires five separate nozzle plates.
2. The operator would be required to handle exposed powder.
3. It would require either five delays or a variable elevation for launching or a variable delay requiring a fuse setter.
4. Due to field assembly there is a greater chance of malfunctioning.

The primary differences between designs #1 and #3 is that #1 would be assembled during manufacture and #3 would be field assembled by the operator.

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The relative advantages and disadvantages of these three designs should be carefully evaluated in respect to the desired use and operation of this device and a decision to guide us should be reached so that no appreciable delay would result from our working on one of the designs which would not meet the service requirements of the device.

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